June 20, 1996

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JUN 21 1996

Federal Communications Commission
Office of Secretary

EX PARTE

William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street, N.W.- Rm. 222
Washington, D.C. 20554

Re: CS Docket No. 96-45

Dear Mr. Caton:

On May 30, 1996, Susan Baldwin and Michael DeWinter of Economics and Technology Inc., and representatives of The National Cable Television Association met with the Federal-State Joint Board on behalf of The National Cable Television Association.

You will find attached a copy of the handouts that were distributed to the Joint Board. At that meeting, the ETI representatives reiterated the comments filed by NCTA in the above proceeding. If you have any questions concerning this matter, please contact the undersigned.

Sincerely,

Richard L. Cimerman

cc: Deborah Dupont

0+1

ETI'S CORRECTIONS TO AND SENSITIVITY ANALYSES OF THE BENCHMARK COST MODEL

Presentation to the Staff of the Joint Board on Universal Service

May 30, 1996

ECONOMICS AND TECHNOLOGY, INC.

ONE WASHINGTON MALL • BOSTON, MASSACHUSETTS 02108

ETI's approach to assessing the Benchmark Cost Model

- Response to US West's concerns about ETI's sensitivity analyses
- General overview of the BCM
- Rationale for examining the variables, assumptions, and algorithms discussed in ETI's two reports

Corrections and sensitivity analyses

Run of the BCM on a 49-CBG data sample

Questions and answers

BCM Default

- **Mid-80s switch costs, no remote serving units, public data**

ETI

- **Early-90s switch costs, public data**

BCM Default

- **Residential and business lines reflected in switch cost computations**
- **Only single residential lines included to size outside plant**
- **Low fill factor in outside plant engineered for volatile demand (e.g., additional lines, businesses)**

ETI

- **Switch costs expressed only on a per-line basis, thus presence of businesses is moot for switch cost computations**
- **Single line basic residential service, thus stable demand, thus high fill factor**
- **Sensitivity analysis of including businesses for deploying outside plant**
- **Some of economies of scale and scope should flow back to single line residence service**

BCM Default

- **Structure costs vary in a linear fashion with cable costs**

ETI

- **Structure costs vary in a non-linear fashion**

BCM

- **Digital loop equipment costs and fiber-copper crossover point are contradictory**

ETI

- **Sensitivity analyses of these related assumptions**

BCM

- **Computes costs at CBG level**
- **Computes USF requirement at CBG level**

ETI

- **Computes costs at CBG level**
- **Computes USF requirements at wire center level**

BCM

- **No adjustment for penetration rate**

ETI

- **Adjustment for penetration rate**

ETI Demonstration

- **Real model**
- **Real data**
- **Only 49 CBGs (from Missouri)**
- **Thus nonsensical "results"**

USER INPUTS TO MODEL

4200 =Maximum Copper Feeder Cable Size

3600 =Maximum Copper Distribution Cable Size

SLC Cost per Access Line: 500

AFC Cost per Access Line: 550

Fill Factors for Electronics
0.95 AFC
0.95 SLC
0.95 Switching

Cable Fill factors

	Feeder	Distribution
0	0.95	0.95
5	0.95	0.95
200	0.95	0.95
650	0.95	0.95
850	0.95	0.95
2550	0.95	0.95

Enter 2 digit whole percentage numbers for the following data:

Fiber Feeder UG/Aerial Mix Table

Density	UG%	Aerial%
0-5	60	40
5-200	65	35
200-650	70	30
650-850	80	20
850-2550	90	10
>2550	100	0

Fiber Cable Discount % (Enter whole % in space below): 20

Copper Cable Discount % (Enter whole % in space below): 20

AFC Electronics Discount %: 10

SLC electronics Discount %: 20

Copper Feeder UG/Aerial Mix Table

Density	UG%	Aerial%
0-5	60	40
5-200	65	35
200-650	70	30
650-850	80	20
850-2550	90	10
>2550	100	0

Distribution UG/Aerial Mix Table

Density	UG%	Aerial%
0-5	90	10
5-200	80	20
200-650	70	30
650-850	65	35
850-2550	60	40
>2550	50	50

Fiber Cable Cost

Cable Size	Cost UG	Cost Aerial
144	5.56	5.24
96	3.80	3.53
72	2.84	2.65
60	2.41	2.23
48	1.98	1.84
36	1.60	1.46
24	1.18	1.05
18	0.98	0.85
12	0.79	0.66

Feeder Cable Cost

Cable Size	Cost UG	Cost Aerial
4200	25.70	25.40
3600	22.20	21.90
3000	18.80	18.50
2400	14.30	14.10
1800	12.44	12.24
1200	10.68	10.00
900	7.82	7.51
600	7.13	7.05
400	4.56	4.62
200	2.36	2.33
100	1.262	1.266

Distribution Cable Cost

Cable Size	Cost UG	Cost Aerial
3600	22.20	21.90
3000	18.80	18.50
2400	14.30	14.10
1800	12.44	12.24
1200	10.68	10.00
900	7.82	7.51
600	7.13	7.05
400	4.56	4.62
200	2.36	2.33
100	1.262	1.266
50	0.675	0.572

Pricing after discount

AFC	495
SLC	400

Inputs/Algorithms of the BCM Analyzed by ETI

(Analyses Conducted in isolation or simultaneously through runs of the BCM using Washington State input data as described in Appendix 8 of the ETI Report)

ETI Corrections of the BCM

Input/Algorithm	**BCM Default Value**	**Adjustment/Sensitivity Analysis**
Per Line Switch Cost	$238.87	Reduced to $167 Per Line
Fixed Cost per Switch	$647,526	Reduced to $0
Feeder and Distribution Cable Fill Factors	Feeder: 65% - 80% Dist.: 25% - 75%	Feeder and Distribution Fill Factors Increased to 95%
SLC and AFC Fill Factors	80%	Increased to 95%
Subscribership Rate	No Allowance	Average cost per line divided by .96 to reflect subscribership rate in Washington State
Aggregation to the Wire Center	BCM computes costs and USF requirement at the CBG level	Costs computed at the CBG level; USF requirement computed at the wire center level

Selected Sensitivity Analyses Conducted by ETI

SLC and AFC Costs and Discounts	SLC: $500 20% AFC: $550 10%	SLC: $250 40% AFC: $500 25%
Copper/Fiber Crossover Point	Fiber used when total distribution distance exceeds 12,000 feet	Crossover point lowered to 9,000 feet and increased at 3,000 foot intervals up to 27,000 feet
Business Lines	Only recognized in calculation of switch investment/line	Number of households grossed up by a factor of 1.44

BCM Default Results
Washington State

Density	Data	Total
<=5	Sum of # Households	62,645
	Average of Loop Length	81,872.32
	Average of Loop $ per HH	4,513.14
	Average of Total Invstmnt/Ln	5,176.39
>2550	Sum of # Households	364,583
	Average of Loop Length	8,070.19
	Average of Loop $ per HH	218.26
	Average of Total Invstmnt/Ln	479.26
200 to 650	Sum of # Households	273,086
	Average of Loop Length	15,153.19
	Average of Loop $ per HH	430.99
	Average of Total Invstmnt/Ln	717.90
5 TO 200	Sum of # Households	372,988
	Average of Loop Length	28,234.15
	Average of Loop $ per HH	1,003.67
	Average of Total Invstmnt/Ln	1,356.13
650 to 850	Sum of # Households	109,294
	Average of Loop Length	12,680.94
	Average of Loop $ per HH	332.85
	Average of Total Invstmnt/Ln	604.04
850 to 2550	Sum of # Households	689,169
	Average of Loop Length	11,045.12
	Average of Loop $ per HH	323.62
	Average of Total Invstmnt/Ln	589.75

Density	Data	Total
<=5	Average of Monthly Cost1	136.64
	Average of Monthly Cost2	99.08
>2550	Average of Monthly Cost1	12.65
	Average of Monthly Cost2	9.17
200 to 650	Average of Monthly Cost1	18.95
	Average of Monthly Cost2	13.74
5 TO 200	Average of Monthly Cost1	35.80
	Average of Monthly Cost2	25.96
650 to 850	Average of Monthly Cost1	15.95
	Average of Monthly Cost2	11.56
850 to 2550	Average of Monthly Cost1	15.57
	Average of Monthly Cost2	11.29

	ARMIS	DIRECT
Aggregate Support at $20=	$ 158,350,839	$ 77,846,835
Aggregate Support at $30=	$ 97,982,543	$ 50,692,630
Aggregate Support at $40=	$ 72,368,201	$ 37,662,589
Annual Benchmark Cost =	$ 524,623,612	$ 380,427,268
State Average Monthly Cost=	$ 23.36	$ 16.94

BCM default values

Partially Corrected BCM Results
USF Requirement Computed at the CBG Level
Washington State

Density	Data	Total
<=5	Sum of # Households	62,645
	Average of Loop Length	81,872.32
	Average of Loop $ per HH	4,303.10
	Average of Total Invstmnt/Ln	4,477.28
>2550	Sum of # Households	364,583
	Average of Loop Length	8,070.19
	Average of Loop $ per HH	198.98
	Average of Total Invstmnt/Ln	373.16
200 to 650	Sum of # Households	273,086
	Average of Loop Length	15,153.19
	Average of Loop $ per HH	356.31
	Average of Total Invstmnt/Ln	530.49
5 TO 200	Sum of # Households	372,988
	Average of Loop Length	28,234.15
	Average of Loop $ per HH	866.56
	Average of Total Invstmnt/Ln	1,040.74
650 to 850	Sum of # Households	109,294
	Average of Loop Length	12,680.94
	Average of Loop $ per HH	293.74
	Average of Total Invstmnt/Ln	467.92
850 to 2550	Sum of # Households	689,169
	Average of Loop Length	11,045.12
	Average of Loop $ per HH	294.19
	Average of Total Invstmnt/Ln	468.37

Density	Data	Total
<=5	Average of Monthly Cost1	123.11
	Average of Monthly Cost2	89.27
>2550	Average of Monthly Cost1	10.26
	Average of Monthly Cost2	7.44
200 to 650	Average of Monthly Cost1	14.59
	Average of Monthly Cost2	10.58
5 TO 200	Average of Monthly Cost1	28.62
	Average of Monthly Cost2	20.75
650 to 850	Average of Monthly Cost1	12.87
	Average of Monthly Cost2	9.33
850 to 2550	Average of Monthly Cost1	12.88
	Average of Monthly Cost2	9.34

	ARMIS	DIRECT
Aggregate Support at $20=	$ 63,696,334	$ 29,230,056
Aggregate Support at $30=	$ 36,307,269	$ 17,429,545
Aggregate Support at $40=	$ 25,193,258	$ 11,430,572
Annual Benchmark Cost =	$ 389,651,154	$ 282,552,902
State Average Monthly Cost=	$ 17.35	$ 12.58

$167 Per Line Switch
Moderate Cable Multipliers
Fill Factors 95% for Cable Feeder and Distribution
Fill Factors 95% for Electronics
96% Penetration Rate Adjustment

Summary of the Impact of ETI Corrections to the BCM on the Average Monthly Cost and the Aggregate Support Requirement for Washington State.

Per Line Switch Cost Reduced from Default Level of $238.87 to $167 (Fixed Cost per Switch of $647,526 Eliminated)			
	Default BCM	ETI Correction	Percentage Decrease
Aggregate Support at $20	$77,846,835	$61,393,675	21%
Aggregate Support at $30	$50,692,630	$41,171,091	19%
Aggregate Support at $40	$37,662,599	$30,674,620	19%
Annual Benchmark Cost	$380,427,268	$328,869,847	14%
State Average Monthly Cost	$16.94	$14.64	14%

Feeder and Distribution Cable Fill Factors Increased from Default Levels to 95% Distribution Cable Multipliers Adjusted for Rural Areas			
	Default BCM	ETI Correction	Percentage Decrease
Aggregate Support at $20	$77,846,835	$38,486,149	51%
Aggregate Support at $30	$50,692,630	$22,756,400	55%
Aggregate Support at $40	$37,662,589	$14,653,261	61%
Annual Benchmark Cost	$380,427,268	$322,808,207	15%
State Average Monthly Cost	$16.94	$14.37	15%

Note: Results for all tables reflect use of the Hatfield/MCI Cost Factor.

Summary of the Impact of ETI Corrections (Cont'd.)

Per Line Switch Cost Reduced from Default Level of $238.87 to $167 Fixed Cost per Switch of $647,526 Eliminated Feeder and Distribution Fill Factors Increased to 95% Distribution Cable Multipliers Adjusted for Rural Areas Cost Results Adjusted to Reflect 96% Subscribership Rate			
	Default BCM	ETI Correction	Percentage Decrease
Aggregate Support at $20	$77,846,835	$29,230,056	62%
Aggregate Support at $30	$50,692,630	$17,429,545	66%
Aggregate Support at $40	$37,662,589	$11,430,572	70%
Annual Benchmark Cost	$380,427,268	$282,552,902	26%
State Average Monthly Cost	$16.94	$12.58	26%

Note: Results reflect use of the Hatfield/MCI Cost Factor.

Summary of the Impact of ETI Sensitivity Analyses of the BCM on the Average Monthly Cost and the Aggregate Support Requirement for Washington State.

Per Line Costs for SLC and AFC Electronics Reduced from Default Levels of $500 and $550 Respectively to $250 and $500 Respectively. Discount Levels Reduced from Default Levels of 20% and 10% Respectively to 40% and 25% Respectively.			
	Default BCM	ETI Correction	Percentage Decrease
Aggregate Support at $20	$77,846,835	$36,759,502	53%
Aggregate Support at $30	$50,692,630	$27,483,209	46%
Aggregate Support at $40	$37,662,589	$21,762,983	42%
Annual Benchmark Cost	$380,427,268	$268,096,113	30%
State Average Monthly Cost	$16.94	$11.94	30%

Copper/Fiber Crossover Point Increased from Default Level of 12,000 feet to 27,000 Feet			
	Default BCM	ETI Correction	Percentage Decrease
Aggregate Support at $20	$77,846,835	$74,035,606	4.9%
Aggregate Support at $30	$50,692,630	$50,409,276	0.6%
Aggregate Support at $40	$37,662,589	$37,676,291	0%
Annual Benchmark Cost	$380,427,268	$336,930,132	11.4%
State Average Monthly Cost	$16.94	$15.00	11.5%

Note: Results reflect use of the Hatfield/MCI Cost Factor.

BCM Input Data

cll	company name	block	quadrant	omega	alpha	dist-ft	totlh	area-sq miles	density-totlh/area	ROCK DEPTH	ROCKHARD	Surf Tex	WATER DEPTH
ADRNMOAX	SOUTHWESTERN BELL - MO	290139701002	4	311.4	41.4	19978.67	451	123.90	3.64	52.63		SICL	2.47
ADRNMOAX	SOUTHWESTERN BELL - MO	290139701003	1	24.71	24.71	974.55	489	2.20	222.59	52.63		SICL	2.47
ADRNMOAX	SOUTHWESTERN BELL - MO	290139701004	4	280.95	10.95	3718.58	155	1.97	78.64	52.63		SICL	2.47
ADVNMORA	SOUTHWESTERN BELL - MO	290179503001	2	128.09	38.09	40085.88	447	106.18	4.21	60.00		SIL	4.60
ADVNMORA	SOUTHWESTERN BELL - MO	290179503003	3	199.96	19.96	36818.63	202	41.48	4.87	60.00		SIL	2.16
ADVNMORA	SOUTHWESTERN BELL - MO	292079701001	1	337.04	22.96	20570.1	337	47.07	7.16	60.00		SIL	2.62
ADVNMORA	SOUTHWESTERN BELL - MO	292079701004	3	181.94	1.94	6999.17	653	11.11	58.79	60.00		FSL	3.46
AGNCMOAL	SOUTHWESTERN BELL - MO	290210026006	2	109.12	19.12	10601.32	499	21.36	23.36	55.00		SIL	4.89
ALBYMOXA	MISSOURI TEL CO	290759601002	2	70.29	19.71	16419.04	211	135.26	1.56	60.00		SICL	3.03
ALBYMOXA	MISSOURI TEL CO	290759601003	1	30.42	30.42	9618.46	531	7.04	75.41	60.00		SICL	3.03
ALBYMOXA	MISSOURI TEL CO	290759601004	2	107.6	17.6	3777.14	350	4.78	73.26	60.00		SIL	2.75
ALDLMOXA	MISSOURI TEL CO	292279601001	2	125.03	35.03	3415.43	150	88.24	1.7	60.00		SICL	3.03
ALMAMOXA	ALMA TEL CO	291070004008	4	256.58	13.42	14389.04	334	47.31	7.06	55.00		SIL	4.89
ALTNMOXA	CONTEL OF MO INC DBA GTE MO	291499601001	2	57.95	32.05	6701.78	346	5.06	68.35	46.15		SIL	5.64
ALTNMOXA	CONTEL OF MO INC DBA GTE MO	291499601002	4	289.43	19.43	6733.06	451	62.04	7.27	46.15		SIL	5.64
ALTNMOXA	CONTEL OF MO INC DBA GTE MO	291499601003	1	34.26	34.26	41965.37	255	182.14	1.4	46.15		SIL	5.64
ALTNMOXA	CONTEL OF MO INC DBA GTE MO	291499603001	3	222.95	42.95	41113.19	134	48.38	2.77	46.15		SIL	5.64
AMRTMOXA	CRAW-KAN TEL COOP INC - MO	290139702004	1	13.48	13.48	34194.07	368	66.67	5.52	43.11		SIL	3.94
AMSTMOXA	CRAW-KAN TEL COOP INC - MO	290139702003	1	359.65	0.35	21116.89	327	73.15	4.47	52.63		SICL	2.47
AMZNMOXA	GTE NORTH INC - MO	290030101004	4	302.55	32.55	18879.86	182	6.65	27.38	55.00		SIL	4.89
AMZNMOXA	GTE NORTH INC - MO	290030103002	3	141.04	38.96	15747.99	336	44.04	7.63	60.00		SICL	2.95
ANNPMOXA	CONTEL OF MO INC DBA GTE MO	290939704002	2	71.6	18.4	33083.68	421	110.50	3.81	58.13		SIL	4.38
ANNPMOXA	CONTEL OF MO INC DBA GTE MO	290939704003	4	267.38	2.62	20202.95	264	38.37	6.88	50.14		SIL	4.86
ANNPMOXA	CONTEL OF MO INC DBA GTE MO	290939704004	1	338.44	21.56	29106.42	91	42.72	2.13	58.13		SIL	4.38
ANTOMO50	SOUTHWESTERN BELL - MO	290997001061	2	63.76	26.24	17874.51	285	3.54	80.47	50.14		FL-SICL	4.86
ANTOMO50	SOUTHWESTERN BELL - MO	290997001064	2	47.31	42.69	11207.39	337	5.36	62.82	50.14		FL-SICL	4.86
ANTOMO50	SOUTHWESTERN BELL - MO	290997002025	2	105.34	15.34	12766.32	424	5.44	77.87	50.14		FL-SICL	4.86
ANTOMO50	SOUTHWESTERN BELL - MO	290997005003	3	173.67	6.33	13534.29	937	16.29	57.53	50.14		FL-SICL	4.86
ANTOMO50	SOUTHWESTERN BELL - MO	290997005004	4	242.13	27.87	10097.68	227	3.52	64.45	50.14		FL-SICL	4.86
ANTOMO50	SOUTHWESTERN BELL - MO	290997005006	4	234.92	35.08	23533.16	229	4.63	49.44	49.58		FL-SICL	5.17
ANTOMO50	SOUTHWESTERN BELL - MO	290997006022	4	304.46	34.46	13455.88	712	14.00	50.85	50.14		FL-SICL	4.86
APCYMOXX	UNITED TEL CO OF MISSOURI - MO	291859601003	1	344.21	15.79	39606.6	252	116.13	2.17	52.63		SIL	2.47
APCYMOXX	UNITED TEL CO OF MISSOURI - MO	291859601004	2	130.15	40.15	4116.43	341	3.51	97.09	52.63		SIL	2.47
APCYMOXX	UNITED TEL CO OF MISSOURI - MO	291859601005	1	354.64	5.36	5739.22	242	2.11	114.77	52.63		SIL	2.47
ARBLMOXA	NORTHEAST MISSOURI RURAL TEL CO	291999601004	4	266.35	3.65	14890.14	282	84.43	3.34	60.00		SIL	3.67
ARCHMOAX	SOUTHWESTERN BELL - MO	290370612002	1	25.6	25.6	24087.92	348	59.08	5.89	52.63		SIL	2.47
ARCHMOAX	SOUTHWESTERN BELL - MO	290370612003	2	118.71	28.71	16304.07	424	15.57	27.24	60.00		SIL	2.80
ARCLMOXA	CONTEL OF MO INC DBA GTE MO	290579602003	3	210.33	30.33	25112.08	303	116.09	2.61	49.58		SIL	5.17
ARGYMOPA	SOUTHWESTERN BELL - MO	291519903003	3	157.78	22.22	19906.26	311	34.56	9	49.58		SIL	5.17
ARMSMOCR	SOUTHWESTERN BELL - MO	290899601002	3	204.25	24.25	20019.63	411	79.96	5.14	55.00		SIL	4.89
ARRIKMOXA	MID-MISSOURI TEL CO	291959606006	2	70.6	19.4	28795.58	331	111.82	2.96	55.79		SIL	3.84
ASBRMOXA	CRAW-KAN TEL COOP INC - MO	290970122001	1	14.89	14.89	16249.94	517	79.54	6.5	43.11		FSL	3.94
ASGVMOOR	SOUTHWESTERN BELL - MO	290770050005	1	316.77	43.23	13858.62	406	49.10	8.31	60.00		CR-SIL	3.93
ASGVMOOR	SOUTHWESTERN BELL - MO	290770050006	2	49.17	40.83	4006.65	564	6.40	88.12	60.00		CR-SIL	3.93
ASLDMOXA	GTE NORTH INC - MO	290190017011	1	42.69	42.69	23148.19	343	34.96	9.81	60.00		GR-SIL	2.48
ASLDMOXA	GTE NORTH INC - MO	290190017012	2	114.8	24.8	3984.61	345	3.37	102.4	60.00		GR-SIL	2.48
ASLDMOXA	GTE NORTH INC - MO	290190017013	4	258.79	11.21	21667.81	848	56.53	15	58.50		SIL	4.51
ASLDMOXA	GTE NORTH INC - MO	290190017022	2	125.76	35.76	21264.23	642	48.82	13.15	58.50		SIL	4.51
AVLLMOXA	CONTEL OF MO INC DBA GTE MO	290970121002	1	37.24	37.24	2517.66	440	62.68	7.02	49.58		SIL	5.17

Attachment to Reply Comments of US West in CC Docket No. 96-45

surrebuttal, Copeland, May 1, Utah at 7:

> The second item that causes an understatement of loop cost occurs when placement and structure costs are calculated using the BCM's weighted structure multiplier cost table with small cable sizes. This causes an understatement of investment because the decline in capitalized trench costs is not linear with the decline in per foot investment cost of copper cable as cable sizes decrease. Generally the per-foot costs to dig a trench or plow a cable are not a function of cable size, but rather a function of surface and soil conditions (e.g., plowable soil in rural area or asphalt cut and restore in urban area). This understatement has been pointed out by GTE in the California Universal Service proceeding, as well as ETI in the FCC's proceeding.